

# DESIGN FOR REAL KIDS

Great design does not have to equal costly design. In India, a group of science educators lead by Arvind Gupta have been showing the world how inspired design using easily accessible, affordable materials can change children's lives.

## If we wish to make the world a better place we should make available for free the best resources in education to the poorest children on earth.

The Indian education system has a lot of inertia. In the past, efforts to get children into schools have met with some success. But the quality of schooling remains woefully poor, below par. Most schools still do not have a science lab. In some schools they exist only because they are mandatory. But the children seldom visit them. All the expensive equipment in labs is locked in cupboards. A perceptive observer can see a grime of dust on all the glass test-tubes, beakers and other plastic apparatus. Occasionally, if some children are lucky, an inspired teacher may take them to the lab and give them a demonstration for producing Oxygen.

The fact is that we are afraid to ask real questions – because we ourselves don't have a clue to the answers. Instead, we become masters at foisting a centralized, alien curriculum on children which has no truck with their lives or culture.

In the mid 1970s the Hoshangabad Science Teaching Program (HSTP) changed this paradigm. They introduced science activities in government schools. First they experimented with 16 schools for 5 years. Later the program spread to over a 1000 schools.

### The principles were simple:

1. A child learns from the concrete to the abstract; from the local to global.
2. Engage with real children and teachers. Understand their needs, elicit suggestions, and build upon them.
3. Curriculum, experiments should be designed not in an isolated lab, but in deep dialogue and collaboration with children and teachers.
4. Fancy glassware and expensive apparatus is alien to the lives of village children. So search for low-cost, local alternatives.
5. This engagement unleashed the innate creativity of children and teachers. They came up with very innovative solutions.

### A few examples:

**Dissecting Needle:** Inside the four walls of a classroom is not the best place for learning science – especially a subject like Botany.

This subject is best learnt outdoors in the fields where plants grow. The girls were given a long needle with a plastic handle for dissecting flowers.

One day on a field trip a girl forgot to carry her “dissecting needle” on a field trip. Most farmers hack branches of the thorny Acacia tree and place them along the field boundaries to prevent marauding cattle.

The girl went and plucked a 2-inch long Acacia thorn as a substitute for the dissecting needle. The Acacia thorn was a splendid substitute for the dissecting needle.

**Matchstick Models:** In rural India people still cook on fire and a matchbox is readily available. One mechanical contraption which has made inroads in India's 700 thousand villages it is the humble bicycle. Even in a small town you will find a bicycle repair and spare part shop. Using bits of cycle valve tube as joints, and matchsticks as members' children made an array of 2-D and 3-D shapes. They could perch a pyramid on top of a cube to make a house. Mecanno like they could construct many 3-D structures using rubber tube joints of four, five and six.

**Simple Electric Motor:** Making a D.C. motor from a 1.5-volt torch battery is simplicity. All you need is a magnet, 1-meter of insulated motor rewinding wire, two long safety pins and a piece of old cycle tube. Using these materials the children could make a working model of the motor in less than 10-minutes. And what a joy it is to make an electric motor which actually spins!

These kinds of activities hook children to science for life.

**The Syringe Generator:** It takes less than half an hour to make this generator. A Neodymium Magnet is placed in the barrel of an old injection syringe. The magnet can move to and fro inside the syringe. 1000 turns of thin, insulated motor rewinding copper wire is wound on the barrel. The ends of this coil are scrapped of insulation and connected to an LED.

On moving the magnet to and fro in the syringe barrel, the LED lights up. This is truly an empowering experiment.

Traditional toys, especially the dynamic ones – which spin, make sound, balance etc — are an excellent aid for teaching science. We have documented over 1300 such science activities, toys and experiments on our website [www.arvindguptatoys.com](http://www.arvindguptatoys.com). Today we have over 7000 videos on Toys from Trash in 20 languages on our website. This material has been freely accessed by 48-million viewers across the world.

Finally, if we wish to make the world a better place we should make available for free the best resources in education to the poorest children on earth. Only then will there be peace on earth. ■.